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The Benefits Of Aerobic Exercise In The Mental Wellness Of Older Adults: A Systematic Review And Narrative Analysis

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Public health is often conceptualized as prevention of physical illness, however recent data suggests that there is an increasing need to address mental health issues, and thus, to provide integrated healthcare. Depression has become a common condition in elderly people. It is well known that aerobic exercise is beneficial with regard to other health issues. Thus, this study seeks to answer the question: Is aerobic exercise effective in decreasing depressive symptoms in older adults. A systematic review was conducted on peer-reviewed studies published from 2007 to 2018 about aerobic exercise as an intervention for depression in adults above the age of 65. Articles reviewed met the following eligibility criteria: a) observational studies or randomized control trials with at least 20 participants; b) an intervention of at least 6 weeks for 2 hours a week; c) studies conducted in Canada or countries with comparable health standards. After preliminary screening, articles deemed to

be relevant to the research question were examined and using a pre-determined data extraction tool, information was extracted and qualitatively synthesized. It was found that aerobic exercise had a positive impact on mental health of older adults. Additionally, many articles listed walking as one of the more effective interventions in contributing to better mental health. Information from this review can be implemented as laws, which policy makers can employ for an overall healthier population.

Influence of acetaminophen and ibuprofen on *Daphnia magna* survival and physiology

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The increase in Canada's aging population is leading to enhanced pharmaceutical discharge into wastewater, which can negatively affect water quality and aquatic species. Municipal wastewater is the largest single effluent discharge in Canada, and can contain disease-causing pathogens, personal care products, and pharmaceuticals. Exposure to these substances can have adverse effects on aquatic organisms, such as *Daphnia magna*, a common freshwater invertebrate that plays an important role in the aquatic food chain and is one of the best studied subjects in ecology. In this experiment we tested whether environmentally relevant concentrations of acetaminophen (APAP; Tylenol) and ibuprofen (IBP; Advil) would influence *Daphnia* survival and physiology. *Daphnia* were exposed acutely (48 hours) to either APAP or IBU at environmentally relevant concentrations (based on water samples from Cootes Paradise) or LC50 (lethal concentration to kill 50% of the population) and were scored for survival, growth, heart rate, and respiratory rate. LC50 concentrations significantly reduced survival, while ecologically relevant concentration of APAP and

IBU did not alter survival, heart rate, or respiratory rate. Future studies exposing *Daphnia* chronically (21 days) to APAP and IBU in combination at environmentally relevant concentrations will allow for assessment of reproductive success and physiology. Our findings provide insight into whether the Hamilton wastewater treatment plant is able to cope with increased concentrations of pharmaceuticals in wastewater due to Canada's aging population.

Analysis of Social Factors in Early Identification of High-Cost Patients at Hamilton Health Sciences

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High-cost patients impose a significant financial burden to healthcare systems across the world. The first step to managing high-cost patients is to identify them. Current strategies to identifying high-cost patients are ineffective, using conventional statistics applied exclusively on data available in electronic health records (EHRs). Social determinants of health (SDH) are known to influence an individual's health condition but are thought to be rarely captured in EHRs. Recent advancements in predictive analytics using machine learning provide renewed hope in identifying high-cost patients early. In this study, we retrospectively reviewed twenty-five patients' medical records at Hamilton Health Sciences to find available SDHs in supporting the prediction of high-cost patients. Our results show that SDHs captured in EHRs are few, inconsistent, and unstructured. They alone, are difficult to support accurate prediction of high-cost patients. However, not all hope is lost. Future efforts should consider cross-referencing available EHR data with alternate datasets containing SDHs to integrate SDHs into predictive analysis of high-cost patients. Datasets to consider include Statistics Canada and Canadian Community Health Survey. Accurate predictive analysis of high-cost patients enables earlier identification and intervention thereby paving way for the development of novel evidence-based clinical pathways to

better manage high-cost patients.

Insect, mammalian, and plant cell based vaccines: promising novel alternatives to egg-based influenza vaccines

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Current influenza vaccine production methods are flawed and inferior to novel alternative means. This is a concern for the aging population as they present a greater need for a cost-effective, efficient, and safe alternative, being the most at-risk group for influenza infections and further severe symptoms. Current vaccine production utilizes sterile eggs to generate viral like particles (VLPs). This technique utilizes a large amount of resources and time, requiring a six-month time-frame, and upwards of two sterile eggs per one vaccine. In this literature review, mammalian cell-, insect cell-, and plant cell-based vaccines were studied in terms of efficacy, efficiency, and safety with comparisons to egg-based vaccines. FluBlok and FlucelVax, two insect- and mammalian cell-based FDA approved vaccines, have been studied in this paper along with further comparisons to Medicago's Phase III plant cell-based vaccine. All three vaccines show greater control for sterility in the final vaccine product and a greatly decreased timeframe for vaccine synthesis. The efficacy of all three cell-based vaccines are comparable to egg-based vaccines, with general mean titres (GMTs) for antibodies of influenza at similar levels across multiple influenza A and influenza B sub-strains. However, a greater immunogenicity for specific influenza strains have been seen in cell-based vaccine assays. Obstacles remain for a transition away from egg-based vaccines. All existing infrastructure is designed for egg-based vaccines. It will take large investment to redesign these facilities. While initial financial cost will be high, long term savings and health benefits would justify this change. Further research is necessary to determine which alternative method is best suited for use in the healthcare system; however, all three cell-based vaccines show great promise for use with the elderly, over the egg-based vaccine production method currently used in the medical field.

The Extent of Cognitive Impairments in Elderly

Survivors of War Suffering from PTSD- Meta-Analysis and Systematic Review

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Introduction and objective

Posttraumatic Stress disorder (PTSD) is associated with cognitive deficits. However, cognitive deficits can be confounded by age. We performed a meta-analysis and systematic review on elderly survivors of war suffering from PTSD to estimate the variability in their cognitive impairment based on individual neuropsychological tests.

Methods

This review was conducted under Cochrane (PRISMA) guidelines and registered with PROSPERO (CRD42018090134). We searched for eligible studies, published in English, using MEDLINE, Embase and PsycInfo; the studies were dated from database inception to January 2018. We also reviewed the bibliographic references of previously published reviews. We pooled the test data for meta-analysis if it was reported by two or more studies, if the results were reported in mean and standard deviation, and if the study enrolled elderly patients (age > 60 years). The risk of bias was assessed using the Newcastle–Ottawa Scale for case-control studies, whereas the quality of evidence was determined using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE).

Results

Out of 13 eligible studies, 11 studies compared the cognitive performance in elderly PTSD survivors of war (PTSD+) to the cognitive performance of two other groups: i). Elderly survivors of war not suffering from PTSD (PTSD-) and ii). Elderly healthy control not exposed to war trauma (HC). Moderate quality evidence showed that the PTSD+ group performed significantly worse than the PTSD- and HC groups on the High pair associate-

Explicit memory [0.47 (0.08, 0.86) and -1.18 (-1.54, -0.82)]; Low pair associate- Explicit memory [0.83 (0.43, 1.23) and -0.92 (-1.43, -0.42)] and WMS Recognition Memory Test- Recognition Memory [0.45 (0.05, 0.85) and -0.44 (-0.86, -0.03)] respectively. Moderate quality evidence showed non-significant association for cognitive deficit on the Digit span forward, digit span backward, Color Word Interference Test and percent Associates recall test for implicit memory. High quality evidence showed inconsistent association of deficits in delayed verbal learning (VLT), moderate quality evidence for Information processing speed on the TMT-A and executive function on TMT-B in PTSD+ vs. PTSD- survivor of wars only.

Conclusion

The magnitude of the cognitive deficits in our pooled analysis was small to moderate depending on the neuropsychological test. Most of our pooled analysis suffered from high risk of bias, which lowered the confidence in our results.

Comprehensive examination of therapies for pain in Parkinson's disease – A systematic review and meta-analysis

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Background

Pain in Parkinson's disease (PD) is a debilitating symptom with a prevalence of 68% yet is untreated 50% of the time. What is unclear however, is which treatment is optimal for minimizing pain severity in PD.

Objective

The objective of this systematic review and meta-analysis was to investigate the efficacy of a variety of novel, complimentary,

and conventional treatments for pain in PD and elucidate which therapy is the most effective.

Method

A systematic search was performed using MEDLINE, PsycINFO, Embase, CINAHL, and CENTRAL databases. To identify additional articles, manual searches of reference lists of included trials were also searched. Major neurology conference proceedings occurring between January 2014 to February 2018 were also searched to identify unpublished studies that may be potentially eligible. Two reviewers conducted assessments for study eligibility, risk of bias, data extraction, and quality of evidence rating. A conservative random-effects model was used to pool effect estimates of pain severity.

Results

25 RCTs that encompassed medical, surgical and complementary therapies met our inclusion criteria and exhibited moderate quality evidence. The greatest reductions in pain were found with safinamide (Standardized mean difference (d) = -4.83, 95% CI [-5.07, -4.59], $p < 0.0001$), followed by cannabinoids and opioids, multidisciplinary team care, COMT inhibitors, and electrical and Chinese therapies. Moderate effects in reducing pain were in pramipexole and surgery, while the weakest effects were in dopaminergic agonists and miscellaneous therapies. Safinamide is an important adjunct to standard parkinsonian medication for alleviating pain in PD.

Conclusions

Our found that safinamide was the most efficacious out of all studied therapies in reducing pain in PD. Cannabinoids and opioids, multidisciplinary team care, COMT inhibitors and electrical and Chinese therapies all exhibited relatively lower, yet strong efficacy. Pramipexole, surgery and dopaminergic agonists had limited efficacy. Complementary therapies have little to no efficacy, or increase rather than reduce pain in PD. More trials of high methodological quality focusing on different types of pain, as well as exploring novel therapies for pain in PD are warranted.

NSAIDs and Alzheimer's Disease

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Background

Alzheimer's disease (AD) is neurodegenerative and the most common form of dementia. Individuals with this disorder may not

present symptoms until later years. Alzheimer's effects 402 000 Canadians seniors each year. The relation of nonsteroidal anti-inflammatory drug (NSAIDs) and the amyloid beta in the brain is studied to see if this can treat the disease.

Objective

To evaluate the effect of non-steroidal anti-inflammatory drugs (NSAIDs) specifically aspirin, ibuprofen, nimesulide, sodium diclofenac, and paracetamol, on cognitive function, as measured by mini mental state examination (MMSE), in patients 65 years of age and older with AD, as compared to standard of care.

Search Methods

MEDLINE was searched upto February 2018, without any restriction on language, date or status of publication. Reference lists of included studies and prominent reviews were assessed. Study authors were contacted if additional information was required.

Selection Criteria

Randomised trials assessing the effectiveness of NSAIDs in patients 65 years or older with AD were included. Non-randomised trials and trials involving NSAIDs outside of, aspirin, ibuprofen, nimesulide, sodium diclofenac, and paracetamol, were excluded.

Data Collection and Analysis

Two authors independently screened studies, and extracted data. Narrative summaries of outcomes were provided.

Main Results

Due to resource limitations, two randomised controlled trials with 1178 patients are summarized. The data from other eligible studies are being extracted.

Patrizio 2009 investigated the effects of ibuprofen on cognitive progression of AD. The primary outcome measure was any one-year change in the AD Assessment Scale- Cognitive (ADAS-Cog) subscale score. Secondary measures included change in Mini Mental Scale Examination, Common Drug Review, Basic and Instrumental Activities of Daily Living scales, and Neuropsychiatric Inventory (NPI). The intention-to-treat analysis showed a similar worsening in ADAS-Cog scores between both intervention groups ($p=0.951$). No differences were found for any secondary outcomes.

Green 2009 investigated the effect of Tarenflurbil on cognitive decline and activities of daily living in patients with mild AD. The co-primary efficacy endpoints were the change in scores, from baseline to 18 months, on the ADAS-Cog and Alzheimer Disease

Cooperative Studies-activities of daily living (ADCS-ADL) scales. Tarenflurbil was shown to have no beneficial effect on the co-primary outcomes ($p = 0.86$ and $p = 0.48$ respectively). The tarenflurbil group had a small increase in frequency of dizziness, anemia, and infections.

Conclusion

It is hard to ascertain the certainty of evidence given the ongoing extraction of outcome data from all randomised trials included in the review. Patrizion 2009 and Green 2009 demonstrate no difference in ADAS-Cog subscale scores between patients taking NSAIDs, ibuprofen and tarenflurbil, or placebo. Continued efforts of data collection from randomised controlled trials will elucidate the association between NSAIDs and cognitive function of patients with AD.